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For : A COOLING AND MOLDING WATER TANK FOR A PLASTIC
COMPLICATED PROFILE

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LETTER REGARDING SUBMISSION OF ENGLISH TRANSLATION

Per the requirements of 37 CFR 1.52(d), filed herewith is a translation of the originally filed Chinese language application into English. The English translation was

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provided to the undersigned attorney by the Applicant's Chinese representative, China Sinda Intellectual Property, which firm prepared and filed the Chinese priority application, and is accurate to the best of the undersigned attorney's knowledge and belief.

It is respectfully requested that the English translation be used as the copy for examination purposes in the Patent Office.

FEES

All fees due may be charged to the undersigned attorney's PTO Deposit Account No. 50-1047.

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A COOLING AND MOLDING WATER TANK

FOR EXTRUSION OF A PLASTIC COMPLICATED PROFILE

TECHNICAL FIELD

This invention relates to a cooling tank for extrusion of a plastic complicated profile, and particularly to a cooling and molding water tank for extrusion of a plastic complicated profile for the purpose of cooling and molding of various kinds of plastic complicated profiles manufactured in a continuous manner.

BACKGROUND

Molding die structures for extrusion of plastic complicated profiles have been developed from entirely dry molding structures in the earlier time to molding structures with the combination of dry and wet states, so that a manufacturing speed of plastic profiles is greatly increased. As a dispensable part of the whole system of an extrusion die, a cooling water tank plays a more and more important role in strengthening the cooling effect of plastic profiles, increasing the extrusion speed, and keeping the intrinsic quality of plastic profiles. Presently, extrusion die is developed to have higher speed and better performance. A cooling water tank of plastic complicated profiles, such as Chinese Patent of Utility Model "a molding and cooling mechanism for extrusion of a plastic complicated profile"(Patent No. ZL01237399.0, Announcement No. CN2472911Y) and Chinese Patent of Utility Model "a molding die mechanism for a plastic complicated profile"(Patent No. ZL0322110.0, Announcement No. CN2594001Y), is processed and provided with a water slot or a water hole in locations where a molding block approaches a profile cavity plate inside a water tank, in order to homogeneously cool a local part of a profile or obtain eddy flow of the cooling water. Although both mechanisms mentioned above overcome the defect of poor heat exchange in dry molding structures, the cooling ability still remains restricted. Obviously, the existing molding and cooling mechanisms cannot meet the needs for high speed and excellent efficiency of an extrusion die. As shown in Chinese Patent of Utility Model "a cooling water tank for the production of a plastic complicated profile"(Patent No. ZL01262430.6, Announce No. CN2491214Y), which provides with a cooling water tank which is disposed with a set of molding plates inside the tank body of a water tank, said set of molding plates are arranged so that they are spaced more and more away from each other from an inlet to an outlet of the water tank. In this way, the manufacturing cost of a water tank is reduced, however the problems of homogeneously cooling of the profiles and promoting cooling efficiency still exist. Therefore, it has become one of urgent technical problems to be solved in the technical field to develop a new cooling and molding water tank with better cooling ability and cooling characteristics of high

efficiency and homogeneity.

SUMMARY OF THE INVENTION

The invention aims to overcome the defects and shortcomings existing in the prior art, and provide a cooling and molding water tank for continuous extrusion of a complicated profile, in order to promote the cooling efficiency and the cooling homogeneity during the extrusion of a plastic complicated profile, and sufficiently guarantee the efficiency and quality of a profile molding during a high speed extrusion.

To obtain the objects mentioned above, it is provided a cooling and molding water tank for extrusion of a plastic complicated profile, comprising a tank body, said tank body including front and rear end blocks, a top cover of, two side plates, a bottom plate and a plurality of foot plates which are in bolted or hinged joint. An inlet pipe is provided on the side plate near the front end block, and an outlet pipe is provided on the side plate near the rear end block. A vacuum valve and a vacuum gauge are provided on the top cover. A plurality of molding blocks and water collection plates are provided along the length direction inside the tank body, said molding blocks and water collection plates being spaced from each other, and the intervals therebetween becoming wider from the front end to the rear end.

Said molding blocks and water collection plates are inserted into a receptacle at the internal side of the side plates of the water tank, which have a limited freedom of motion in the longitudinal, transverse and vertical directions.

The number of said molding blocks is 5-30.

The number of said water collection plates is 3-28.

U-shape water passage slots are provided on the four peripheral sides of said molding blocks.

The width of said U-shape water passage slot is 0.2-0.8 of the side length of said molding block, the depth of which is ranged 2-15 mm according to the size of the molding blocks.

An adjusting mechanism is provided on the long side of the profile cavity passage of said molding block. The adjusting mechanism includes a through kurf which is parallel to and 1-8 mm from the plane of the long side of the profile cavity passage, and at least one through screw hole which is provided on and perpendicular to the plane of the long side and intersects with the low side of the kurf, wherein an adjusting screw is engaged with the screw hole and the top of the adjusting screw may extend against the upper side of said kurf.

The width of said kurf is 0.1-2.0 mm, and the length of said kurf is equal to that of the long side of the profile cavity passage, or a little longer or shorter.

The shape of an internal cavity of said water collection plate is the shape of an outwardly expanded section of a plastic complicated profile which expands 0.5-8 mm in the radial direction. The shape of some parts of the internal cavity where are overlapped, adjacent, or complicated can be simplified.

Said water collection plates can be made of stainless steel, alloy aluminum, organic glass, or other stainless and corrosion resistant materials.

The advantages of the invention is that, by using a water collection plate and incorporating a molding block with a novel structure, the water flow state is changed and form a special alternate cycle flow of cooling water so as to accelerate the heat exchange between a profile and the cooling water. In contrast to the prior art, very high cooling efficiency and very good cooling homogeneity is obtained and the efficiency and quality of a profile molding during a high speed extrusion is guaranteed.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 is a front view of an embodiment in accordance with the invention;

Fig.2 is a top view of an embodiment in accordance with the invention;

Fig.3 is a left view of in the direction of B shown in Fig.1 in accordance with the invention;

Fig.4 is a front view, a bottom view and a left view of a molding block;

Fig.5 is a front view and a bottom view of a water collection plate.

Description of the reference numbers in the drawings:

- 1- tank body
- 11- front end block and rear end block
- 12- top cover
- 121- vacuum valve
- 122- vacuum gauge
- 13- side plate
- 14- bottom plate
- 15- foot plate
- 16- inlet pipe
- 17- outlet pipe

- 2- molding block
- 21- U-shape water passage slot
- 22- adjusting mechanism
- 221- kurf
- 222- screw hole
- 223- adjusting screw
- 3- water collection plate
- 31- internal cavity

DETAILED DESCRIPTION

An embodiment of the present invention will be described by reference to the following detailed description of an embodiment in accordance with the present invention when taken in conjunction with the accompanying drawings.

As shown in Fig. 1, 2 and 3, which are respectively a front view, a bottom view and a left view in the B direction according to an embodiment of the invention, a cooling and molding water tank for extrusion of a plastic complicated profile includes a tank body 1 including front and rear end block 11, top cover 12, two side plates 13, a bottom plate 14 and a plurality of foot plates 15 which are in bolted or hinged joint. An inlet pipe 16 is provided on the side plate 13 near the front end block 11, and an outlet pipe 17 is provided on the side plate 13 near the rear end block 11. A vacuum valve 121 and a vacuum gauge 122 are provided on the top cover 12. A plurality of molding blocks 2 and water collection plates 3 are provided along the length direction inside the tank body 1, said molding blocks and water collection plates being spaced from each other, wherein the intervals therebetween becoming wider from the front end to the rear end.

As shown in Fig. 1 and 2, said molding blocks 2 and water collection plates 3 are respectively inserted into receptacles at the internal side of the side plates 13 of the water tank, which have a limited freedom of motion in the longitudinal, transverse and vertical directions.

The number of said molding blocks 2 is 5-30. As shown in Fig. 1 and 2, the number of said molding blocks 2 is 14 according to this embodiment.

The number of said water collection plates is 3-28. As shown in Fig. 1 and 2, the number of said water collection plates 3 is 9 according to this embodiment.

As shown in Fig. 4, a flat U-shape water passage slot 21 is provided on each periphery side of said molding blocks 2.

The width of said U-shape water passage slot 21 is 0.2-0.8 of the side length of the molding block 2, the depth of which is ranged 2-15 mm according to the size of

the molding blocks. In this embodiment, the width of said U-shape water passage slot 21 is about 0.7 of the side length of the molding block 2, the depth of which is designated as 8 mm.

As shown in Fig. 4, an adjusting mechanism 22 is provided on the long side of the profile cavity passage of said molding block 2. The adjusting mechanism 22 includes a through kurf 221 which is parallel to and 1-8 mm from the plane of the long side of the profile cavity passage, and at least one through screw hole 222 which is provided on the plane of the long side, such as a screw hole 222 according to this embodiment. Said screw hole 222 is perpendicular to the plane of the long side and intersects with the lower side of the kurf 221, wherein an adjusting screw 223 is engaged with the screw hole 222 and the top of the adjusting screw 223 may extend against the upper side of said kurf 221. When the profile cavity passage of the molding block 2 does not have a long side, an adjusting mechanism 22 may not be provided. When the profile cavity passage of a molding block 2 has more than one long sides, more than one adjusting mechanisms 22 may be provided respectively according to the locations of the long sides. When a long side is very long, a kurf 221 is very long too, so two or more screw holes 222 and adjusting screws 223 may be provided.

The width of said kurf is 0.1-2.0 mm, and the length of said kurf is equal to that of the long side of the profile cavity passage, or a little longer or shorter.

As shown in Fig.5, the shape of an internal cavity 31 of said water collection plate 3 is the shape of an outwardly expanded section of a plastic complicated profile (profile cavity passage) which expands 0.5-8 mm in the radial direction. The shape of some parts of the internal cavity 31 of the water collection plate 3 where are overlapped, adjacent, or complicated can be simplified. In the present embodiment, the radial expansion distance is 5 mm, and the shape of the internal cavity is simplified so as to facilitate water passage, as is the simplified shape of an internal cavity shown in Fig.5.

Said water collection plate 3 can be made of stainless steel, alloy aluminum, organic glass, or other stainless and corrosion resistant materials. In the present embodiment, the water collection plate 3 is made of stainless steel.

In extrusion, a plastic complicated profile enters the front end block 11 of the water tank 1 along the A direction shown in Fig.1. When the profile gradually becomes shaped through molding blocks 2 and water collection plates 3, the cooling water firstly passes through the U-shape water passage slots 21 disposed around the molding plate 2, then through a gap with a width of 0.5-8 mm between the profile and the internal cavity 31 of the water collection plate 3, then through the U-shape water passage slots 21 disposed around the next molding plate 2, then through a gap with a width of 0.5-8 mm between the profile and the internal cavity 31 of a water collection

plate 3, and continues to circulate as described above, as is shown using arrows in Fig.1 and Fig.2, because molding plates 2 and water collection plates 3 are spaced from each other in the tank body 1, and the intervals therebetween become wider from the front end to the rear end. Thus, the cooling water flow forms an periphery-inner circle-periphery alternate flow cycle. Also, because the cooling water passes evenly along the outer surface of the profile when passing through the internal cavity 31 of the water collection plate 3, the profile can be cooled homogeneously and high efficiently in a high-speed extrusion. Good profiled effect and quality can be sufficiently guaranteed in a high-speed extrusion because of the high cooling efficiency.

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